CLAIMS

1. An apparatus for differentiating articles, comprising:

an acoustic generator for generating acoustic energy;

a plurality of articles located in receiving relation relative to the acoustic energy, and wherein the plurality of articles receive at least a portion of the acoustic energy, and wherein at least some of the acoustic energy received by the plurality of articles is converted into electromagnetic energy;

a sensor for detecting at least some of the electromagnetic energy generated by the conversion of the acoustic energy; and

a processor operably coupled with the sensor for differentiating the plurality of articles based upon the electromagnetic energy sensed.

2. The apparatus of claim 1, wherein the plurality of articles comprise food products.

3. The apparatus of claim 1, wherein the plurality of articles comprise meat, bone and cartilage.

4. The apparatus of claim 1, wherein the acoustic generator comprises at least one transducer.

5. The apparatus of claim 1, wherein the acoustic generator comprises a plurality of transducers.

6.   The apparatus of claim 1, wherein the acoustic generator comprises a plurality of transducers which direct the acoustic energy toward the plurality of articles from a plurality of predetermined angles.

7.   The apparatus of claim 1, wherein the acoustic generator comprises a plurality of transducers which direct the acoustic energy toward the articles from a plurality of predetermined angles, and wherein the processor receives information from the plurality of predetermined angles, and wherein the information received from the plurality of predetermined angles is averaged.

8.   The apparatus of claim 1, wherein the sensor comprises a solenoid coil.

9.   The apparatus of claim 1, wherein the acoustic energy has a predetermined frequency, and wherein the electromagnetic energy generated by the conversion has a frequency, and wherein the frequency of the acoustic energy and the frequency of the electromagnetic energy generated by the conversion are substantially equal.

10.   The apparatus of claim 1, wherein the acoustic generator comprises a plurality of transducers for generating acoustic energy, and wherein the plurality of transducers do not generate acoustic energy while the articles convert previously emitted acoustic energy into electromagnetic energy.

11. The apparatus of claim 1, wherein the processor utilizes the relative conversion efficiencies of the plurality of articles to map their respective locations.

12. An apparatus for differentiating articles in a product stream, comprising:

an acoustic generator for generating acoustic energy;

a product stream located in receiving relation relative to the acoustic energy, and wherein the product stream includes a plurality of articles, and wherein at least some of the acoustic energy is received by the plurality of articles, and wherein at least some of the acoustic energy received by the plurality of articles is converted into electromagnetic energy;

a sensor for detecting at least some of the electromagnetic energy generated by the conversion; and

a processor operably coupled with the sensor for differentiating the plurality of articles.

13. The apparatus of claim 12, wherein the plurality of articles comprise food products.

14. The apparatus of claim 12, wherein the plurality of articles comprise meat, bone and cartilage.

15. The apparatus of claim 12, wherein the acoustic generator comprises at least one transducer.

16. The apparatus of claim 12, wherein the acoustic generator comprises a plurality of transducers.

17. The apparatus of claim 12, wherein the acoustic generator comprises a plurality of transducers which direct the acoustic energy toward the plurality of articles from a plurality of predetermined angles.

18. The apparatus of claim 12, wherein the acoustic generator comprises a plurality of transducers which direct the acoustic energy toward the articles from a plurality of predetermined angles, and wherein the processor receives information from the plurality of predetermined angles, and wherein the information received from the plurality of predetermined angles is averaged.

19. The apparatus of claim 12, wherein the sensor comprises a solenoid coil.

20. The apparatus of claim 12, wherein the acoustic energy has a predetermined frequency, and wherein the electromagnetic energy generated by the conversion has a frequency, and wherein the frequency of the acoustic energy and the frequency of the electromagnetic energy generated by the conversion are substantially equal.

21.   The apparatus of claim 12, wherein the acoustic generator comprises a plurality of transducers for generating acoustic energy, and wherein the plurality of transducers do not generate acoustic energy while the articles convert previously emitted acoustic energy into electromagnetic energy.

22.   The apparatus of claim 12, wherein the processor utilizes the relative conversion efficiencies of the plurality of articles to map their respective locations.

23.   An apparatus for differentiating articles in a product stream, comprising:

        a product stream which includes acceptable and unacceptable articles with differing electro-mechanical conversion efficiencies;

        an acoustic generator which produces acoustic energy which is directed to the articles traveling in the product stream, and wherein the respective articles based upon their individual electro-mechanical conversion efficiencies convert the acoustic energy into electromagnetic energy;

        a sensor for receiving at least some of the electromagnetic energy generated by the conversion of the acoustic energy; and

        a processor operably coupled with the sensor for differentiating between the acceptable and unacceptable articles based on their respective electro-mechanical conversion efficiencies.

24.   The apparatus of claim 23, wherein the acceptable and unacceptable articles comprise food products.

25. The apparatus of claim 23, wherein the acceptable and unacceptable articles comprise meat, bone and cartilage.

26. The apparatus of claim 23, wherein the acoustic generator comprises at least one transducer.

27. The apparatus of claim 23, wherein the acoustic generator comprises a plurality of transducers.

28. The apparatus of claim 23, wherein the acoustic generator comprises a plurality of transducers which direct the acoustic energy toward the plurality of articles from a plurality of predetermined angles.

29. The apparatus of claim 23, wherein the acoustic generator comprises a plurality of transducers which direct the acoustic energy toward the acceptable and unacceptable articles from a plurality of predetermined angles, and wherein the processor receives information from the plurality of predetermined angles, and wherein the information received from the plurality of predetermined angles is averaged.

30. The apparatus of claim 23, wherein the sensor comprises a solenoid coil.

31.   The apparatus of claim 23, wherein the acoustic energy has a predetermined frequency, and wherein the electromagnetic energy generated by the conversion has a frequency, and wherein the frequency of the acoustic energy and the frequency of the electromagnetic energy generated by the conversion are substantially equal.

32.   The apparatus of claim 23, wherein the acoustic generator comprises a plurality of transducers for generating acoustic energy, and wherein the plurality of transducers do not generate acoustic energy while the articles convert previously emitted acoustic energy into electromagnetic energy.

33.   The apparatus of claim 23, wherein the processor utilizes the relative conversion efficiencies of the acceptable and unacceptable articles to map their respective locations.

34.   An apparatus for differentiating acceptable and unacceptable articles in a product stream, comprising:

an acoustic generator for generating acoustic energy

a product stream located in receiving relation relative to the acoustic energy, and which includes acceptable articles including meat and unacceptable articles including bone and cartilage, and wherein the acceptable and unacceptable articles have differing electro-mechanical conversion efficiencies, and wherein the acceptable and unacceptable articles receive at least some of the acoustic energy, and wherein the acceptable and unacceptable articles convert at least some of the received acoustic energy into electromagnetic energy;

a sensor for detecting at least some of the electromagnetic energy generated by the conversion; and

a processor operably coupled with the sensor for differentiating between the acceptable and unacceptable articles based on their respective electro-mechanical conversion efficiencies.

35.   The apparatus of claim 34, wherein the acoustic generator comprises at least one transducer.

36.   The apparatus of claim 34, wherein the acoustic generator comprises a plurality of transducers.

37. The apparatus of claim 34, wherein the acoustic generator comprises a plurality of transducers which direct the acoustic energy toward the plurality of articles from a plurality of predetermined angles.

38. The apparatus of claim 34, wherein the acoustic generator comprises a plurality of transducers which direct the acoustic energy toward the acceptable and unacceptable articles from a plurality of predetermined angles, and wherein the processor receives information from the plurality of predetermined angles, and wherein the information received from the plurality of predetermined angles is averaged.

39. The apparatus of claim 34, wherein the acoustic energy has a predetermined frequency, and wherein the electromagnetic energy generated by the conversion has a frequency, and wherein the frequency of the acoustic energy and the frequency of the electromagnetic energy generated by the conversion are substantially equal.

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43. The apparatus of claim 34, wherein the acoustic generator comprises a plurality of transducers for generating acoustic energy, and wherein the plurality of transducers do not generate acoustic energy while the articles convert previously emitted acoustic energy into electromagnetic energy.

44. The apparatus of claim 34, wherein the processor utilizes the relative conversion efficiencies of the acceptable and unacceptable articles to map their respective locations.

45. An apparatus for differentiating acceptable and unacceptable articles in a product stream, comprising:

an acoustic generator including a plurality of transducers positioned at predetermined angles relative to the product stream for generating acoustic energy;

a product stream located in receiving relation relative to the acoustic energy, and wherein the product stream includes acceptable articles consisting of meat and unacceptable articles which include bone and cartilage, and wherein the acceptable and unacceptable articles have differing electro-mechanical conversion efficiencies, and wherein the acceptable and unacceptable articles receive at least some of the acoustic energy, and wherein the acceptable and unacceptable articles convert at least some of the received acoustic energy into electromagnetic energy;

a sensor for detecting at least some of the electromagnetic energy generated by the conversion of the acoustic energy; and

a processor operably coupled with the sensor, and which utilizes information received from the sensor to map the electro-mechanical conversion efficiencies of the acceptable and unacceptable articles, and to differentiate between the acceptable and unacceptable articles.

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46. The apparatus of claim 45, wherein the processor receives information from the plurality of transducers positioned at predetermined angles, and wherein the information received from the plurality of predetermined angles is averaged.

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47. The apparatus of claim 45, wherein the sensor comprises a solenoid coil.

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48. The apparatus of claim 45, wherein the acoustic energy has a predetermined frequency, and wherein the electromagnetic energy generated by the conversion has a frequency, and wherein the frequency of the acoustic energy and the frequency of the electromagnetic energy generated by the conversion are substantially equal.

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49. The apparatus of claim 45, wherein the plurality of transducers do not generate acoustic energy while the articles convert previously emitted acoustic energy into electromagnetic energy.

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50. The apparatus of claim 45, wherein the processor utilizes the relative conversion efficiencies of the acceptable and unacceptable articles to map their respective locations.

51. A method for differentiating articles, comprising:

generating acoustic energy;

directing the acoustic energy toward a product stream which includes acceptable and unacceptable articles having differing electro-mechanical conversion efficiencies;

converting at least some of the acoustic energy received by the acceptable and unacceptable articles into electromagnetic energy at rates relative to the acceptable and unacceptable articles respective electro-mechanical conversion efficiencies;

detecting at least some of the electromagnetic energy generated by the conversion; and

differentiating the acceptable and unacceptable articles based upon their respective electro-mechanical conversion efficiencies as indicated by the sensed electromagnetic energy.